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This Report is Informal and the Conclusions are only Tentative

SUFFIELD FIELD REPORT NO. 142 (4 May 1945) CLASS II

M-1-217

Decontamination of Mustard Gas at Low Temperatures.

REFERENCE

Field Experiment No. 212 carried out 14 Feb. (Part I) and 7th April (part II) 1945.
Field Report No. 57

INTRODUCTION

1. This report deals with two trials which have been carried out at the request of C.W.S. to determine whether standard methods of decontaminating mustard gas would be satisfactory at low temperatures.

2. One trial (Field Report No. 57) in which a truck contaminated with HM was decontaminated at an air temperature of -6°C (21°F) had been carried out prior to the trials reported here, but since bright sunshine obtained during the trial, it is unlikely that the surfaces involved were at air temperature.

MATERIALS

3. Decontaminating Apparatus M1 (3 gallon)
Decontaminating Apparatus M2 (1½ quart)
Agent Decontaminating M4
Dry Bleach Grade 3 (U.S.)
1 x 500 lb. L.C. bomb charged HSC/MM (mustard gas thickened with methacrylate polymer)
1 x 30 lb. L.C. bomb charged HBD/MM
1 x 30 lb. L.C. bomb charged Levinstein HS.

Decontaminating equipment was stored in the open and the bombs at room temperature prior to the trials. The bombs were fitted with bursters which were arranged for static firing.

PROCEDURE

Part I

4. An area of concrete free from snow and ice and measuring 60 feet by 15 feet, was contaminated by HSC/MM from a 500 lb. L.C. bomb burst statically 5 yards upwind of it.

5. As soon as the HSC/MM had solidified, Dry Bleach Grade 3 was applied to the contamination by means of shovels and brooms.

6. When the area was considered to have been decontaminated three observers wearing issue boots walked once round the area. Their boots were then removed and placed in a 12 cu.m. chamber in which the air was circulated by means of fans. The air temperature was 75°F. The concentration of H vapour present after two hours was estimated by both the iodoplatinate and DB3 method. The above procedure was repeated with a further three pairs of boots 24 hours after contamination.

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Part II

7. Two steel sheets measuring 36 inches by 96 inches were laid on the ground and heavily contaminated one with Levinstein HS and the other with HBD/MM from 30 lb. L.C. bombs functioned upwind of them.

8. As soon as the contamination had solidified the sheets were decontaminated in a horizontal position using the Decontaminating Apparatus M2 (1½ quart) charged with Agent Decontaminating M4. Swabs were used to assist in removing the contamination.

9. After decontamination the sheets were tested for residual vesicant by means of the hot water bottle - S.D. paper technique described in the addendum to Porton Report No. 2294.

WEATHER

	Part I	Part II
Date	14 Feb. 45	7 April 45
Time (hrs. MDT)	1015	0715
Air Temp. (°C)	-9 (15°F)	-8 (18°F)
Sky	Bright sunshine	Sunshine nil

RESULTS

Part I

10. It was estimated visually that half the concrete area was contaminated to a density exceeding 50 g/sq.m. and the remainder to a density of 5 to 10 g/sq.m.

11. When bleach was first brushed into the solid HSC/MM the charging became soft. Further addition of bleach resulted in the inflaming of the more heavily contaminated areas. Bleach was first applied at approximately 1 lb. per square yard but an additional expenditure of 1 lb. per square yard was considered necessary.

12. The concentration of mustard vapour present in the chamber two hours after the boots from the first traversal had been introduced was 0.3 mg/cu.m. The concentration of mustard vapour produced by the boots from the second traversal after two hours in the chamber was 0.1 mg/cu.m. In both cases a strong odour of bleach was present in the chamber.

Part II

13. A preliminary trial had shown that the Decontaminating Apparatus M1 and M2 functioned satisfactorily at an air temperature of -16°C (3°F).

14. As a result of this preliminary trial only the M2 apparatus was used in Part II.

15. The entire surface of each sheet was treated twice with decontaminating solution and then one half of each sheet was given a third treatment. A total of 1½ U.S. quarts of solution was used in the case of the HBD/MM contamination and 1½ pints in the case of the Levinstein HS contamination. The HS contamination dissolved readily but the solidified HBD/MM dissolved slowly and could not have been removed without the use of swabs.

16. Both halves of each sheet were tested by means of the S.D. test. All tests were negative at 15 minutes.

DISCUSSION

Part I

17. The expenditure of bleach used in decontaminating the area was that usually recommended for such a task.

18. The concentration of mustard vapour observed in the chamber 2 hours after the boots from the first traversal were introduced indicate that the boots might have caused a hazard to the eyes after 4 to 6 hours exposure in a poorly ventilated room.

Part II

19. Three pints of solution were used in decontaminating the sheet contaminated with HBD/M and 1½ pints in the case of the Levinstein HS. Since this consumption included a third application over one half of each sheet, the consumption for two applications, which was shown to be sufficient, was 2½ pints and 1¼ pints respectively. Technical Manual 3-220 suggests that 1 1/3 pints would be sufficient for a heavily contaminated area of the same dimension as the sheets used in the trial.

CONCLUSTION

M-215

20. From the results of these trials if is concluded that mustard gas contamination can be neutralized by dry bleach and by Agent Decontaminating M4 (U.S.) at air temperatures at least down to -8°C (18°F).

21. The trials have shown that it is essential to use swabs when decontaminating solidified mustard gas with Agent Decontaminating M4 sprayed from the M1 or M2 Decontaminating Apparatus.

HJF:jm

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